

REMARKS

This is in response to the Office Action dated September 26, 2006. Claims 1-2, 4-9 and 17-28 are pending.

Allowable Subject Matter Indicated

Applicant notes with appreciation the Examiner's indication that claims 23 and 27 contain allowable subject matter.

Claim 1

Claim 1 now stands rejected under Section 102(e) as being allegedly anticipated by Hayakawa (US 6,450,621). This Section 102(e) rejection is respectfully traversed for at least the following reasons.

Claim 1 requires "a penetration electrode electrically connected to the pad electrode, the penetration electrode being provided so as to pass through each of (a) the aperture section of the field oxide film, (b) a hole formed in the semiconductor substrate, and (c) the aperture section of the pad electrode, the hole in the semiconductor substrate being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate, so that an opening of the hole is smaller than the aperture section of the field oxide film." For purposes of example and without limitation, Fig. 1 of the instant application illustrates a pad electrode 4 formed over the field oxide film 2 so as to overlap the field oxide film 2 when perpendicularly viewing the semiconductor substrate, and a penetration electrode 15 electrically connected to the pad electrode 4. In example Fig. 1, the penetration electrode 15 is provided so as to pass through each of (a) the aperture section of the field oxide film 2, (b) a hole formed in the semiconductor substrate 1, and (c) the aperture section of the pad electrode 4. The cited art to Hayakawa fails to disclose or suggest this combination of features.

The Office Action relies on Figs. 13B and 17 of Hayakawa, and contends that either 32 or 21 in Hayakawa is the “pad electrode” and that 51 is the “penetration electrode.” This rejection is flawed. *First*, element 32 in Hayakawa is a driving substrate (see Fig. 16 and col. 12 at lines 24-29) and cannot possibly be the “pad electrode” of claim 1. For instance, the alleged penetration electrode is not electrically connected to element 32 and does not pass through an aperture section of element 32. *Second*, element 32 in Hayakawa is a driving substrate - not a pad electrode. *Third*, element 21 of Hayakawa (e.g., see Fig. 12) cannot be the claimed pad electrode because the alleged penetration electrode 51 is not electrically connected to element 21 and does not pass through an aperture section of element 51. For at least the foregoing reasons, the Section 102(e) rejection of claim 1 is wrong and should be withdrawn.

Moreover, claim 1 recites “a pad electrode, having an aperture section formed therethrough.” Hayakawa fails to disclose or suggest this. The Office action contends that this is met by Hayakawa’s adjacent inkjets each including electrode 21. However, at best, this teaches a plurality of electrodes – but cannot be the claimed pad electrode because there is no aperture section formed therethrough as required by the claim. One skilled in the art would not consider element 21 in Hayakawa to be a pad electrode with an aperture section formed therethrough.

Claim 1 also recites that the penetration electrode passes through a hole formed in the semiconductor substrate. The Office Action does not identify the alleged hole in the semiconductor substrate. Moreover, element 51 (the alleged penetration electrode in Hayakawa) does not pass through any hole in a semiconductor substrate. Again, Hayakawa fails to meet the invention of claim 1 in this additional respect.

Claim 1 further requires that the penetration electrode passes through the aperture section of the pad electrode. As described above, applicant disagrees with the Examiner’s contention

that 21 is a pad electrode with an aperture section formed therethrough. However, even *assuming arguendo* that 21 is a pad electrode in Hayakawa, the alleged penetration electrode 51 in Hayakawa does not pass through an aperture section in the alleged pad electrode 21 – so that claim 1 still is not met by Hayakawa. Note that element 51 is below layer 18, while the alleged pad electrode 21 is above layer 19.

Still further, claim 1 requires “the hole in the semiconductor substrate being formed entirely within the aperture section of the field oxide film, when perpendicularly the semiconductor substrate.” The only hole in the semiconductor substrate 1 in Hayakawa appears to be the hole between openings 27 and 28 in Fig. 14. However, this hole in semiconductor substrate 1 of Hayakawa is not formed entirely within an aperture section of a field oxide film as viewed perpendicularly. It is also noted that if, *assuming arguendo*, opening 27 were to be considered the aperture section of the field oxide film then the alleged penetration electrode 51 does not pass through this opening 27 and the claim would not be met for this additional reason.

For the foregoing many reasons, the Section 102(e) rejection of claim 1 based on Hayakawa is incorrect and should be withdrawn.

Claim 2

Claim 2 requires that the penetration electrode is formed in a field area of the surface of the semiconductor substrate. The “field area” is clearly defined in the instant specification (e.g., pg. 4, third paragraph). In particular, the instant specification defines a “field area” as “an area where no semiconductor element is provided” (pg. 4, third paragraph). Thus, claim 2 requires that the penetration electrode is formed in an area where no semiconductor element is provided. In contrast, the alleged penetration electrode 51 in Hayakawa is formed in an active area rather

than a field area, because 51 is formed above an NMOS or PMOS. Thus, the Section 102(e) rejection of claim 2 is also incorrect and should be withdrawn.

Claim 5

Claim 5 requires that an insulation film is formed on an internal surface of the hole between the internal surface of the hole and a sidewall of the penetration electrode. Hayakawa and Finnila fail to disclose or suggest this feature. It is not clear which feature of Hayakawa the Examiner contends corresponds to the hole in the substrate. Even assuming that Hayakawa and Finnila were combined (which applicant believes would be incorrect in any event), there still is no teaching or suggestion leading one to form an insulation film is formed on an internal surface of the hole between the internal surface of the hole and a sidewall of the alleged penetration electrode 51 as required by claim 5, especially because the semiconductor substrate 1 is below element 51 as explained above.

Other Claims

Claim 18 requires “pad electrode formed over the field oxide film so as to overlap the field oxide film when perpendicularly viewing the semiconductor substrate; wherein: the pad electrode has an aperture section formed therethrough, the penetration electrode is electrically connected to the pad electrode, *the penetration electrode being provided so as to pass through each of the aperture section of the field oxide film, a hole formed in the semiconductor substrate, and the aperture section of the pad electrode, the hole being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate*, so that an opening of the hole is smaller than the aperture section of the field oxide film; and the *penetration electrode being formed in a field area of the surface of the semiconductor substrate*. Hayakawa fails to disclose or suggest at least the aforesaid italicized features of claim 18.

Claim 19 requires “a pad electrode, having an *aperture section formed therethrough*, the pad electrode being formed over the field oxide film so as to overlap the field oxide film when perpendicularly viewing the semiconductor substrate; wherein: the penetration electrode is electrically connected to the pad electrode, the *penetration electrode being provided so as to pass through each of the aperture section of the field oxide film, a hole formed in the semiconductor substrate, and the aperture section of the pad electrode, and the hole being formed entirely within the aperture section of the field oxide film, when perpendicularly viewing the semiconductor substrate*, so that an opening of the hole is smaller than the aperture section of the field oxide film. Hayakawa fails to disclose or suggest the aforesaid italicized features of claim 19.

Claim 28 requires that the penetration electrode is electrically connected to the pad electrode. However, Hayakawa fails to disclose or suggest that the alleged penetration electrode 51 is electrically connected to the alleged pad electrode 21.

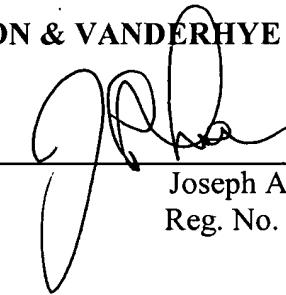
Conclusion

It is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

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Appl. No. 10/828,475
December 26, 2006

Respectfully submitted,

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